

Introduction

We live in a strange and perplexing world. Despite the explosive growth of knowledge in recent decades, we are confronted by a bewildering array of contradictory beliefs. We are told that astronomers have made great progress in understanding the universe in which we live, yet many people still believe in astrology. Scientists claim that the dinosaurs died out 65 million years ago, yet some insist that dinosaurs and human beings lived simultaneously. Apollo 11 landed on the moon in 1969, but it is rumoured in some quarters that the landings were faked by NASA. A work of art is hailed as a masterpiece by some critics and dismissed as junk by others. Some people support capital punishment, while others dismiss it as a vestige of barbarism. Millions of people believe in God, yet atheists insist that 'God is dead'. Faced with such a confusion of different opinions, how are we to make sense of things and develop a coherent picture of reality?

Given your school education, you might think of knowledge as a relatively unproblematic commodity consisting of various facts found in textbooks that have been proved to be true. But things are not as simple as that. After all, if you had attended school one hundred or five hundred years ago, you would have learned a different set of 'truths'. This suggests that knowledge is not static, but has a history and changes over time. Yesterday's revolution in thought becomes today's common sense, and today's common sense may go on to become tomorrow's superstition. So what guarantee is there that our current understanding of things is correct? Despite the intellectual progress of the last five hundred years, future generations may look back on our much-vaunted achievements and dismiss our science as crude, our arts as naive, and our ethics as barbaric.

When we consider ourselves from the perspective of the vast reaches of time and space, further doubts arise. According to cosmologists, the universe has been in existence for about 15 billion (15,000,000,000) years. If we imagine that huge amount of time compressed into one year running from January to December, then the earliest human beings do not appear on the scene until around 10.30 p.m. on 31 December, fire was only domesticated at 11.46 p.m., and the whole recorded history occupies only the last ten seconds of the cosmic year. Since we have been trying to make sense of the world in a systematic way for only a minute fraction of time, there is no guarantee that we have got it right. Furthermore, it turns out that in cosmic terms we are also pretty small. According to astronomers, there are ten times more stars in the night sky than grains of sand in all the world's deserts and beaches. Yet we flatter ourselves that we have discovered the laws that apply to *all* times and *all* places. Since we are familiar with only a minute fraction of the universe, this seems like a huge leap of faith. Perhaps it will turn out that some of the deeper truths about life, the universe and everything are simply beyond human comprehension.

Common sense

Most people do not think that there is a problem of knowledge and they see knowledge as nothing more than organised common sense. While there may be something to be said for this view, the trouble is that much of what passes for

common sense consists of little more than vague and untested beliefs that are based on such things as prejudice, hearsay and blind appeals to authority. Moreover, many things that at first seem obvious to common sense become less and less obvious the closer you look at them.

Yet we need some kind of picture of what the world is like if we are to cope with it effectively, and common sense at least provides us with a starting point. We all have what might be called a **mental map** of reality which includes our ideas of what is true and what is false, what is reasonable and what is unreasonable, what is right and what is wrong, etc. Although no one but a fool would tell you to rip up your mental map and abandon your everyday understanding of things, you should – at least occasionally – be willing to subject it to critical scrutiny.

To illustrate the limitations of our common-sense understanding of things, let us make an analogy between our mental maps and real geographical maps. Consider the map of the world shown below, which is based on what is known as the Mercator Projection. If you were familiar with this map as you grew up, you may unthinkingly accept it as true and be unaware of its limitations.



Figure 1.1 The Mercator Projection

- ?** 1 Think of as many different ways as you can in which the world map shown in Figure 1.1 is:
- a inaccurate
 - b based on arbitrary **conventions**
 - c culturally biased.
- 2 Do you think it would be possible to make a perfect map of a city? What would such a map have to look like? How useful would it be?

Among the weaknesses of the above map are the following:

- 1 It distorts the relative size of the land masses, so that areas further from the equator seem larger than they are in reality. The distortion is most apparent when we compare Greenland to Africa. According to the map they are about the same size, but in reality Africa is fourteen times bigger than Greenland.
- 2 It is based on the convention that the northern hemisphere is at the top of the map and the southern hemisphere at the bottom. Although we are used to this way of representing things, the reality is, of course, that the world does not come with a label saying 'This way up'!
- 3 The map is eurocentric in that it not only exaggerates the relative size of Europe, but also puts it in the middle of the map.

Now compare the Mercator Projection with another map of the world, known as the Hobo-Dyer Equal Area Projection.

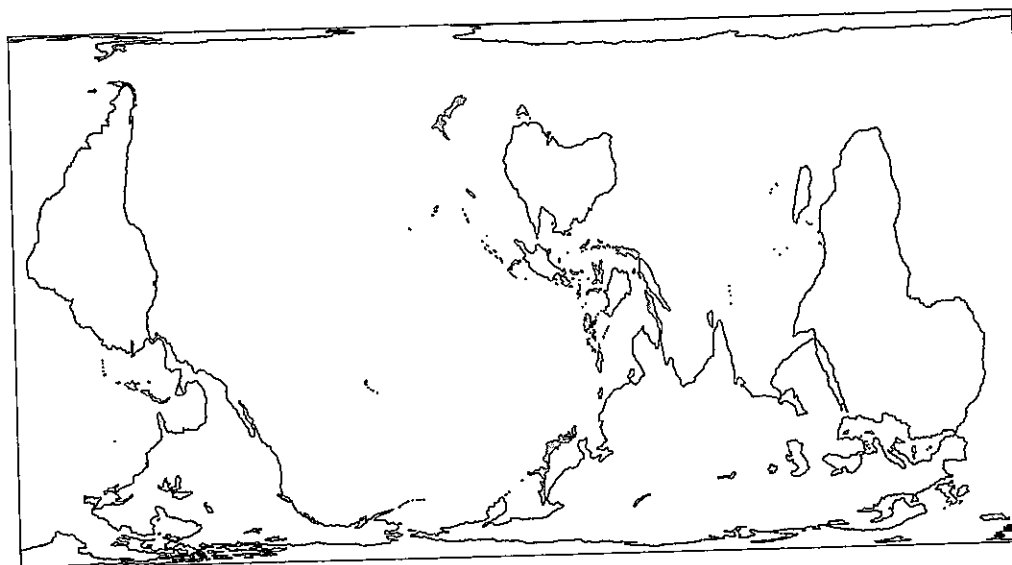


Figure 1.2 Hobo-Dyer Projection

This projection accurately reflects the relative sizes of the land masses (although it distorts their shape); it has the southern hemisphere at the top and the northern hemisphere at the bottom; and it is centred on the Pacific rather than Europe. The fact that most people find this map disorienting illustrates the grip that habitual

ways of thinking have on our minds and how difficult it is to break out of them.

The point of this excursion into maps is to suggest that, like the Mercator Projection, our common-sense mental maps may give us a distorted picture of reality. Our ideas and beliefs come from a variety of sources, such as our own experience, parents, friends, teachers, books and the media, and since we don't have time to check up on everything to make sure that it is true, there are likely to be all kinds of inaccuracies, half-truths and falsehoods woven into our mental maps. Furthermore, it can be difficult for us to think outside the customs and conventions with which we are familiar and see that there may be other ways of looking at things. Finally, there may be all kinds of cultural biases built into our picture of the world. If you ask an English person to name the greatest writer and greatest scientist of all time, they will probably say Shakespeare and Newton. If you ask the same question to an Italian, they are more likely to say Dante and Galileo.

One final point to draw out of this discussion is that, while different maps may be more or less useful for different purposes, there is no such thing as a perfect map. A *perfect* map of a city which included every detail down to the last brick and blade of grass would have to be drawn on a scale of 1:1. Such a map would, of course, be useless as a map, and would in any case quickly become out of date. We might call this the **paradox of cartography**: *if a map is to be useful, then it must of necessity be imperfect*. There will, then, always be a difference between a map and the underlying territory it describes. To sum up in a well-known slogan that is worth keeping in mind throughout this book: **'the map is not the territory'**.

- ?** 1 What relevance do you think the slogan 'the map is not the territory' has to our search for knowledge?
- 2 Look at the painting below by the Belgian surrealist René Magritte (1898-1967) called *The Betrayal of Images* (1928-29). What do you think of the title of the painting? What has this got to do with our discussion?



Figure 1.3

Certainty

If there are problems with our common-sense picture of the world, perhaps we should abandon our everyday understanding of things and limit ourselves to what is certain. For it has often been thought that certainty is what distinguishes knowledge from mere belief. The idea here is that when you know something you are certain it is true and have no doubts about it; but when you merely believe it, you may *think* it is true, but you are not certain. At first sight, this seems reasonable enough; but when you start to look critically at the things we normally claim to know, you may begin to wonder if any of them are completely certain!



List in order the five things in life that you are most certain of. Compare your list with someone else's. Can you come to any agreement?

Consider, for example, the following four statements:

- 1 I know that Neil Armstrong landed on the moon in 1969.
- 2 I know that strawberries are red.
- 3 I know that if a is bigger than b and b is bigger than c , then a is bigger than c .
- 4 I know that murder is wrong.

I imagine you would say that all of the above statements are true. But how do you know? You might say that you know that Neil Armstrong landed on the moon in 1969 because you read it in an encyclopaedia; you know that strawberries are red because you can see that they are red; you know that if a is bigger than b and b is bigger than c , then a is bigger than c because you can reason it out; and you know that murder is wrong because it is intuitively obvious. However, if you ask yourself whether you are 100 per cent certain that these statements are true, doubts may begin to creep in. A quick look at each of the four **ways of knowing** – language, perception, reason and emotion – suggests that they cannot simply be taken at face value.

1 Language

Language enables us to acquire knowledge from other people, and we claim to know a great many things because we have been told them or we have read them somewhere. However, the authority of other people is not always a reliable source of knowledge, and even the so-called experts sometimes 'get it wrong'. If you are into conspiracy theories, you might ask how we can be sure that the alleged American moon landings were not an elaborate CIA-inspired hoax.

2 Perception

Much of our knowledge is based on personal experience, but our senses sometimes deceive us. For example, if you are colour blind, you might not see strawberries as red. We shall have more to say about this in Chapter 4. For the time being, you might like to consider Figure 1.4.

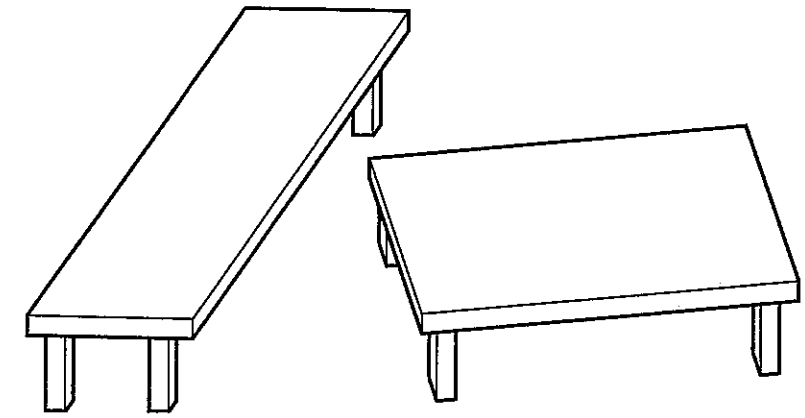


Figure 1.4

Believe it or not, the two table tops above are exactly the same shape and size. This suggests that we should not blindly trust our perception and assume that it gives us certainty.

3 Reason

Statement 3 above might seem less open to doubt than the others, and some philosophers have claimed that reason gives us greater certainty than perception. In practice, however, people do not seem to be very good at abstract reasoning and they are liable to make all kinds of errors. To illustrate, assuming that some dentists are drunkards and no cyclists are drunkards, does it follow that some cyclists are dentists? The answer is that it does not – but we may well struggle to see that this is true.

4 Emotion

Some of the things that we claim to know strike us as intuitively obvious or are based on our gut feelings. The trouble is that what is intuitively obvious to me may not be intuitively obvious to you, and gut feelings are far from being a sure guide to the truth. You only have to consider debates about such things as abortion or capital punishment to see the extent to which people may have conflicting intuitions on important issues. And it would surely be arrogant simply to assume that my intuitions are right and yours are wrong. Emotions may provide us with the energy to pursue knowledge, but it is far from clear that they are infallible guides to the truth.

Radical doubt

So far, we have raised some preliminary doubts about knowledge that is derived from language, perception, reason and emotion. But, following the French philosopher René Descartes (1596–1650), there is perhaps one statement that you think is *absolutely* certain – namely that 'I exist'. Surely that is something that cannot sensibly be doubted?

Well, if pushed, I might say that I am not even sure about that! In the movie *The Truman Show* a character called Truman Burbank lives on an island called Seahaven and leads an apparently ordinary life. As the movie progresses, we learn that Truman's entire life is being filmed 24 hours a day and broadcast live on TV, and that his wife, family, friends and acquaintances are all paid actors. Truman himself is unaware of this and he mistakes his illusory world for reality. So how can you be certain that you are not living a Truman-Show-type life and that the people around you are not simply actors? Some philosophers have even speculated that the whole of life might be a dream. Perhaps you will awake in a few minutes and realise that you have been having the strangest dream in which you were a creature called a human being, living on a planet called Earth. Although such a radical supposition does not prove that you do not exist, it *does* suggest that your life might be completely different from what you thought.

- ?**
- 1 Do you think it is seriously possible that you could be dreaming right now?
 - 2 Do you think that some areas of knowledge are more certain than others?

Relativism

Sometimes people react to this lack of certainty by swinging to the opposite extreme and embracing a position known as **relativism**. According to relativism, there is no such thing as absolute truth that exists in an objective way independent of what anyone happens to *believe* is true. Instead, truth is relative and may be different for different individuals or for different cultures. So rather than say that something is true or false in an unqualified way, the most we can do is say that it is 'true for me' or 'false for you'. Since there are no grounds for saying that one opinion is better than another, we must therefore conclude that all points of view are of equal value.

Since there are disputed questions in all areas of knowledge, relativism might at first seem an attractive position. Rather than insist that I am right and you are wrong, it is surely more attractive to say that one and the same knowledge claim can be true for me and false for you?

Despite its attractions, relativism leads to as many difficulties as equating knowledge with certainty. Consider the question of whether or not the earth is round. According to a relativist we would have to say it is true for me and false for a member of the flat-earth society. But surely there is an objective fact of the matter independent of what I or anyone else may happen to think? After all, the earth cannot be both round *and* flat. In view of this, I think that what people really mean when they say that something is 'true for them' is that they *believe* it is true. You are, of course, entitled to believe what you like, but the mere fact that you believe that something is true doesn't mean that it actually *is* true. A young child might believe that Santa Claus exists, but it only confuses the issue to say that it is 'true

for the child'. For, no matter what the child believes, Santa Claus does not in fact exist.

The fact that we take seriously the idea that someone might be wrong in their beliefs suggests that relativism is false. Indeed, it could be argued that the statement 'All truth is relative' is self-contradictory. For if we ask ourselves about the status of the statement itself, we seem to run into difficulties – as can be seen from the dialogue in Figure 1.5. On the one hand, if it is absolutely true that all truth is relative, then there is at least one absolute truth – namely the truth that all truth is relative. On the other hand, if it is only relatively true that all truth is relative, then if a consistent relativist meets someone who says 'It is *not* true for me that all truth is relative', they are hardly in a position to argue with them.

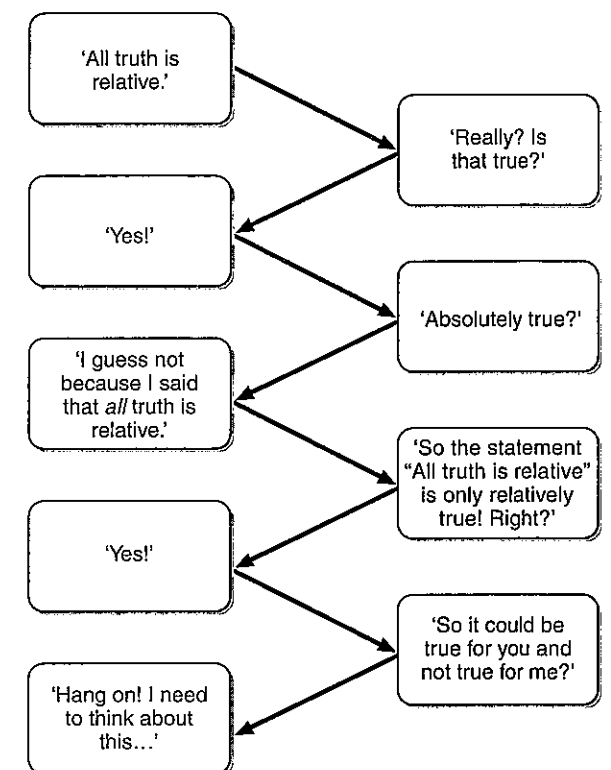


Figure 1.5 The dialogue of relativism

- ?** Read the dialogue taken from a novel *White Noise* by Don DeLillo (see Reading resources, page 19). What doubts does Heinrich cast on his father's claim that it is raining? Which, if any, of these doubts do you think are reasonable?

What should we believe?

We have seen that neither common sense, nor certainty, nor relativism can give us a quick solution to the problem of knowledge. So what should we believe? There is no simple answer to this question, and TOK is, in any case, more concerned with *how* you believe something than with *what* you believe. Whatever you believe, you should, for example, try to support your beliefs with evidence and be able to consider and respond to criticisms of your views.

The role of judgement

Since we live in a world in which there are few black and white certainties, you will probably have to rely more on **judgement** than proof in deciding what to believe. One important aspect of good judgement is the ability to balance scepticism with open-mindedness. Take the claim that aliens have visited the earth at some time in the past – something which opinion polls suggest is believed by around one-third of Americans. We should be sceptical enough to question some of the flimsy evidence that has been put forward to support this claim, but open-minded enough to allow that it is possible that a technologically advanced civilisation may have evolved and sent envoys to our planet. We must then engage in the difficult task of assessing the balance of evidence and coming to a provisional conclusion.

The great marketplace of beliefs in the so-called information age is, of course, the Internet. Surfing around, you can quickly find websites devoted not only to a whole range of academic subjects, but also to a dizzying array of paranormal phenomena, conspiracy theories and urban legends. Since we live in a credulous age, we should cultivate a healthy scepticism as an antidote to intellectual – and financial – gullibility. (If you are too gullible, you will find plenty of charlatans and hucksters out there who will be only too willing to relieve you of your money.)

The danger of gullibility

Now, you may personally believe in some or other paranormal phenomenon or conspiracy theory, and at some point it may even be shown to be true. However, no one is willing to believe *everything* they read on the Internet, and we all have limits beyond which we conclude that a belief is absurd. I very much doubt that you would take seriously any of the following headlines from the *Weekly World News*, which styles itself as 'America's wildest and zaniest supermarket tabloid':

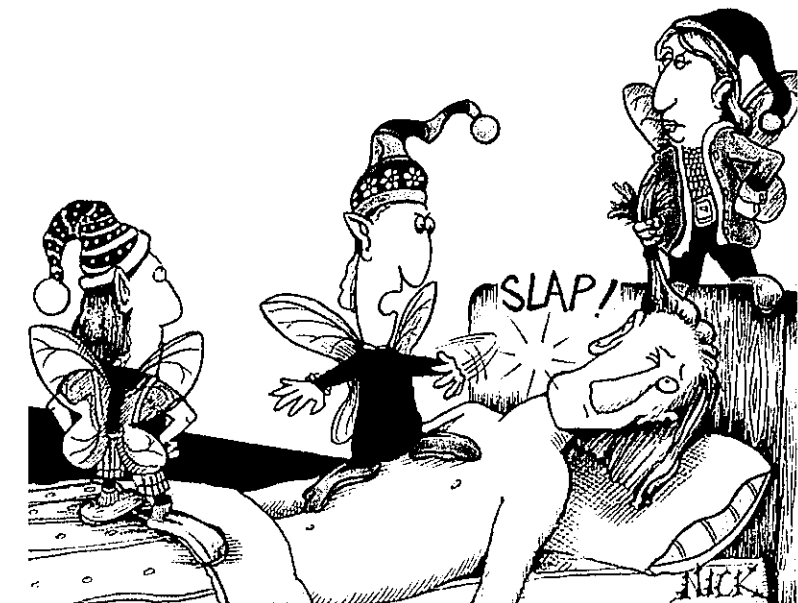
- 'Amazing New Proof of Life After Death' (11 January 1999)
- 'Faith Healer Cures Sick Pets with the Power of Prayer' (13 August 1999)
- 'US Scientists Bring Mummy Back to Life' (27 August 1999)
- 'Washington Think Tanks are Riddled with Space Aliens' (1 October 1999)
- 'First Marriage Between Human and Space Alien Still Going Strong' (8 October 1999)
- 'Dog Reincarnation: Five Ways to Tell if Your Dog was a Human in a Past Life' (12 November 1999)
- 'Top Psychic Warns: Hitler is Coming Back' (21 January 2000)
- 'Top Scientist says Sicko Space Aliens are Stealing Our Women and Turning them into Prostitutes' (6 April 2000)
- 'Your Dead Pet's Ghost May be Peeing on Your Carpet' (16 May 2000)

The danger of scepticism

Despite the above comments, there is also a danger in being *too* sceptical; for you may then close your mind to new ideas that challenge the conventional wisdom. There are many examples of ideas that were ridiculed when they first appeared but

were later shown to be true. For example, until the early nineteenth century, scientists dismissed the idea that stones could fall from the sky as superstition; but we now take the existence of meteorites for granted. Similarly, when Alfred Wegener (1880–1930) suggested the theory of continental drift in 1912, it was rejected by his contemporaries; but it was resurrected in the 1960s as part of the theory of plate tectonics. The moral of the tale is that just because an idea does not fit our currently accepted theories does not necessarily mean that it is wrong. For it is always possible that it is our theories that need to be changed. Thus if we are too sceptical the danger is that intellectual progress will grind to a halt and knowledge stagnate.

So we need to find a balance between being open to new ideas that challenge our current way of thinking, and keeping in mind that human beings are credulous animals who are sometimes willing to believe strange things on the basis of slender evidence.



"For goodness sake, man, SNAP OUT OF IT...!!! We're NOT aliens from outer space!! We're PIXIES! from your GARDEN...!!! IS THAT SO DIFFICULT TO UNDERSTAND...?!?"

Figure 1.6



Comment on the following quotation, and explain why you either agree or disagree with it:

'My view is that there is such a thing as being too open-minded. I am *not* open-minded about the earth being flat, about whether Hitler is alive today, about claims by people to have squared the circle, or to have proven special relativity wrong. I am also not open-minded with respect to the paranormal. And I think it is wrong to be open-minded with respect to these things, just as I think it is wrong to be open-minded about whether or not the Nazis killed six million Jews in World War II.' [Douglas Hofstadter]

Reasonable knowledge

In trying to determine whether or not a knowledge claim is reasonable, two preliminary criteria may serve as useful guides: (1) evidence and (2) coherence.

1 Evidence

For a belief to be reasonable there should be some positive evidence in support of it. Imagine someone claiming that there are little green men living on Mars. When you challenge them to support their belief, they say 'Well, you can't prove that there aren't.' This is a bad argument because the person has given no positive evidence to support their belief; and although it is difficult to prove that there are definitely not little green men on Mars, this simply reflects the fact that it is always difficult to prove a negative. The fact that you can't prove that something *isn't* true does nothing to show that it *is* true. The fallacy of thinking that it does is called **argument *ad ignorantiam***.

- ? 1 Which of the following is an example of argument *ad ignorantiam*?
- a Since many people claim to have seen ghosts, it is likely that they exist.
 - b Many members of the Society for the Paranormal believe in ghosts.
 - c Ghosts must exist because no one has proved that they do not.
 - d It is true for me that ghosts exist.
- 2 Make up three examples of your own to illustrate the fallacy of argument *ad ignorantiam*.
- 3 How would you go about trying to prove that a species has become extinct? What has this got to do with our discussion?

We should look not only for evidence in favour of our beliefs, but also for evidence that would count against them. For, according to psychologists, we have a disturbing tendency, known as **confirmation bias**, to notice only evidence that supports our beliefs. For example, if you believe in astrology, you will tend to notice the times your horoscope is right and overlook the times it is wrong. To counter this tendency, you should keep a record not only of how often the horoscope is right but also of how often it is wrong.

2 Coherence

A second criterion for deciding whether or not a belief is reasonable is whether it coheres, or fits in, with our current understanding of things. Despite appearances, I don't think that this criterion contradicts what we said earlier about the need to question common sense. When it comes to examining our beliefs, our position is like that of a sailor who has to rebuild his ship while still at sea. If he dismantles the ship completely and tries to rebuild it from scratch, he will drown. His only option is to rebuild it piece by piece. Similarly, we cannot cast doubt on all of our beliefs at the same time. The best we can do is examine them one at a time against the

background of our other beliefs. If we don't want to drown, there is simply no other way to proceed.

What this criterion implies is that, although we should be open to new ideas, the more unlikely something is relative to the current state of knowledge, the stronger the evidence in its favour should be before we take it seriously. Consider, for example, the claims of people such as Uri Geller – 'the world's most famous paranormalist' – to be able to bend spoons using only mental energy. Given our current knowledge of the way the world works, it seems unlikely that a spoon can be bent through non-physical means simply by focusing one's mind on it. So before accepting such a belief we should demand good evidence in support of it. As far as I know, no such evidence currently exists.

- ? 1 According to the astronomer Carl Sagan (1934–96), 'extraordinary claims require extraordinary evidence'. Explain what he meant by this. Do you agree?
- 2 Explain, with reasons, which of the following statements you think is less likely to be true.
- a The Loch Ness monster exists.
 - b Some mystics are able to levitate.
- 3 In a book entitled *The Appalling Fraud* (*L'effroyable imposture*), the French author Thierry Meyssan makes the extraordinary claim that a passenger jet did not hit the Pentagon on 11 September 2001, and that the explosion was instead caused by a truck load of explosives. Using the criterion mentioned above, how much evidence would you need in order to be convinced of the truth of Meyssan's claim?

Who cares?

At this point, you might ask whether it really matters what we believe. We may laugh at some of the crazy ideas people hold, but what harm do they do? Don't people have the right to believe what they like? I am as in favour of freedom of belief as the next person, but I think it matters what you believe; and although it may sound undemocratic I think some beliefs are more worthy of respect than others.

One reason why your beliefs and opinions matter is that they are an important – perhaps defining – part of who you are as a person. So if you want to be something more than a 'second-hand self' who mindlessly repeats the opinions of other people, you need to make your beliefs and opinions genuinely your own by subjecting them to critical scrutiny. Socrates (470–399 BCE) once famously said that 'The unexamined life is not worth living.' Although it would make little sense to be *constantly* examining your beliefs, I think that if you *never* examine them you end up leading a life that is not genuinely your own.

A second reason why beliefs matter is that people's beliefs affect their actions; and, in some cases at least, beliefs can literally be a matter of life and death. For example, between the fifteenth and seventeenth centuries in Europe, an estimated half a million people were burnt to death because they were believed to be guilty of

the 'crime' of witchcraft. Fortunately, we no longer burn people to death for witchcraft; but there is no shortage of dangerous and misguided beliefs in circulation. Here are two examples:

- 1 A former chief executive of Philip Morris once claimed that cigarettes are no more addictive than gummy bears candy. But the statistical evidence suggests that every cigarette you smoke shortens your life by about the amount of time it takes to smoke it.
- 2 In 1997, the leader of an American religious cult called 'Heaven's Gate' persuaded his followers that if they 'shed their bodies' they would be beamed on board a spaceship behind the Hale-Bopp comet and taken to a new world. 39 people committed suicide as a result.



- 1 Do you think we should respect the beliefs of a racist or sexist person? Give reasons.
- 2 Find some examples of beliefs that you think are both misguided and dangerous.

The French philosopher Voltaire (1694–1778) once said that 'People who believe absurdities will commit atrocities.' Although most people who hold eccentric beliefs show no interest in massacring their neighbours, I think there is an element of truth in Voltaire's comment. A society in which 'anything goes' is a fertile breeding ground for fanatics and extremists of all kinds. Some historians have observed that the rise of Hitler in Germany was accompanied by a growing interest in various kinds of pseudo-science. The psychologist Viktor Frankl (1905–97), who was a survivor of a Nazi concentration camp, sees a direct link between the two: 'I am absolutely convinced that the gas chambers of Auschwitz, Treblinka, and Maidanek were ultimately prepared not in some ministry or other in Berlin, but rather at the desks and in the lecture halls of nihilistic scientists and philosophers.' If there is any truth in this claim, then each of us has the responsibility, at least occasionally, to take a critical look at our own beliefs and prejudices.

Conclusion

At the beginning of this chapter, we saw that it is difficult to form a coherent picture of reality in the modern world. The way we see the world is shaped by our history, and by culture and psychology; and since in cosmic terms we have not been around very long, we may wonder if we have any privileged access to the truth. We then looked at three possible solutions to the problem of knowledge – common sense, certainty and relativism – and we saw that none of them is entirely adequate. Since the problem of knowledge has no easy solution we must use our judgement in trying to decide what to believe.

I hope that at this stage you will agree that there is a problem of knowledge and that it is worth spending some time thinking about it. What we now need to do is look in more detail at what we mean by the word 'knowledge'. That is the task of Chapter 2.

Key points

- The world is a confusing place in which we find a bewildering variety of different opinions.
- Our common-sense picture of reality probably contains inaccuracies and biases that we are not aware of.
- We acquire knowledge about the world through language, perception, reason and emotion, but none of these ways of knowing can give us certainty.
- According to relativism, truth is relative to the individual; but the fact that we take seriously the idea that someone may be wrong in their beliefs suggests that relativism is false.
- Since there are few black and white certainties in the world, we have to rely more on judgement.
- An important aspect of good judgement is finding the right balance between scepticism and open-mindedness.
- Two preliminary criteria for deciding whether a knowledge claim is plausible are evidence and coherence.
- Since we are what we believe and our beliefs affect our actions, if we want to be authentic and responsible we should occasionally subject our beliefs to critical scrutiny.

Terms to remember

argument *ad ignorantiam*
certainty
coherence
common sense
confirmation bias
evidence
gullibility
judgement

mental map
open-mindedness
paradox of cartography
paranormal phenomena
relativism
scepticism
ways of knowing

Further reading

André Comte-Sponville, *The Little Book of Philosophy* (Heinemann, 2004), Chapter 5: 'Knowledge'. A beautifully written chapter on knowledge, scepticism and certainty. Since it is written by a philosopher, it is quite challenging, but it is worth reading, thinking about, and then reading again!

Carl Sagan, *The Demon Haunted World* (Ballantine, 1997). This classic text written from a scientific and sceptical point of view contains many thought-provoking chapters. Try Chapter 12, 'The Fine Art of Baloney Detection', Chapter 17, 'The Marriage of Skepticism and Wonder', and Chapter 19, 'No Such Thing as a Dumb Question'.